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Claims

[c1] 1. A micro-switching device comprising:
a base substrate;
a movable portion including an anchor part and an extending part, the anchor part being connected to the base substrate, the extending part extending from the anchor part and facing the base substrate;
a movable contact part provided on the extending part on a side opposite to the base substrate;
a first stationary contact electrode fixed to the base substrate and including a first contacting part facing the movable contact part; and
a second stationary contact electrode fixed to the base substrate and including a second contacting part facing the movable contact part.

[c2] 2. The micro-switching device according to claim 1, further comprising a first driving electrode provided on the movable portion on a side opposite to the base substrate, and a second driving electrode fixed to the base substrate and including a section facing the first driving electrode.

[c3] 3. The micro-switching device according to claim 1, fur-

ther comprising a first driving electrode provided on the movable portion on a side opposite to the base substrate, a piezoelectric film disposed on the first driving electrode, and a second driving electrode disposed on the piezoelectric film.

[c4] 4. The micro-switching device according to claim 1, wherein the extending part is made of monocrystalline silicon.

[c5] 5. The micro-switching device according to claim 1, wherein at least one of the first stationary contact electrode and the second stationary contact electrode has a thickness of no smaller than 5 μm.

[c6] 6. The micro-switching device according to claim 1, wherein the extending part has a thickness of no smaller than 5 μm.

[c7] 7. A micro-switching device comprising:
a base substrate;
a movable portion including an anchor part and an extending part, the anchor part being connected to the base substrate, the extending part extending from the anchor part and facing the base substrate;
a stationary member connected to the base substrate;
a movable contact part provided on the extending part

on a side opposite to the base substrate;
a first stationary contact electrode connected to the stationary member and including a first contacting part facing the movable contact part; and
a second stationary contact electrode connected to the stationary member and including a second contacting part facing the movable contact part.

[c8] 8. The micro-switching device according to claim 7, wherein the stationary member is spaced away from the movable portion.

[c9] 9. The micro-switching device according to claim 7, wherein the stationary member surrounds the movable portion.

[c10] 10. The micro-switching device according to claim 7, wherein the stationary member includes a plurality of stationary island parts that are spaced away from one another and are each connected to the base substrate.

[c11] 11. The micro-switching device according to claim 7, further comprising a first driving electrode provided on the movable portion on a side opposite to the base substrate, and a second driving electrode connected to the stationary member and including a section facing the first driving electrode.

[c12] 12. The micro-switching device according to claim 7, wherein the extending part is made of monocrystalline silicon.

[c13] 13. The micro-switching device according to claim 7, wherein at least one of the first stationary contact electrode and the second stationary contact electrode has a thickness of no smaller than 5 μm.

[c14] 14. The micro-switching device according to claim 7, wherein the extending part has a thickness of no smaller than 5 μm.

[c15] 15. A method of manufacturing the micro-switching device according to claim 7, the method comprising:
a step of preparing a material substrate including a first layer, a second layer and an intermediate layer disposed between the first layer and the second layer, the first layer including a first section, a second section and a third section, the first section being processed into the extending part, the second section being continuous with the first section and processed into the anchor part, the third section being processed into the stationary member;
a first electrode formation step of forming the movable contact part on the first section of the first layer;

a first etching step of performing anisotropic etching on the first layer until the intermediate layer is reached, the anisotropic etching being performed via a mask pattern that masks the first section, the second section and the third section of the first layer;

a sacrifice layer formation step of forming a sacrifice layer with a first opening and a second opening, the first opening being provided for exposing a first connecting region in the third section, the second opening being provided for exposing a second connecting region in the third section;

a second electrode formation step of forming the first stationary contact electrode and the second stationary contact electrode, the first stationary contact electrode being connected to the first connecting region and having the first contacting part facing the movable contact part via the sacrifice layer, the second stationary contact electrode being connected to the second connecting region and having the second contacting part facing the movable contact part via the sacrifice layer;

a sacrifice layer removal step of removing the sacrifice layer; and

a second etching step of etching away a portion of the intermediate layer disposed between the second layer and the first section of the first layer.

[c16] 16. The method according to claim 15, wherein in the first electrode formation step a first driving electrode is further formed on the first section of the first layer, in the sacrifice layer formation step a third opening is further formed in the sacrifice layer for exposing a third connecting region in the third section of the first layer, and in the second electrode formation step a second driving electrode is further formed, the second driving electrode being connected to the third connecting region and including a portion facing the first driving electrode via the sacrifice layer.